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1. Ponds
2. Stocking
3. Species combinations
 - A. L.A. Bass
 - B. L.A. Bass
 - C. L.A. Bass
 - D. L.A. Bass
 - E. L.A. Bass
 - F. L.A. Bass
 - G. L.A. Bass
 - H. L.A. Bass
 - I. L.A. Bass
 - J. L.A. Bass
 - K. L.A. Bass
 - L. L.A. Bass
 - M. L.A. Bass
 - N. L.A. Bass
 - O. L.A. Bass
 - P. L.A. Bass
 - Q. L.A. Bass
 - R. L.A. Bass
 - S. L.A. Bass
 - T. L.A. Bass
 - U. L.A. Bass
 - V. L.A. Bass
 - W. L.A. Bass
 - X. L.A. Bass
 - Y. L.A. Bass
 - Z. L.A. Bass

JOB COMPLETION REPORTS
INVESTIGATIONS PROJECTS

STATE OF MISSOURI

PROJECT NO. P-1-R-19, WORK PLAN NO 4, JOB NO. 7

TITLE OF JOB: An Evaluation of Several Stocking Combinations for Ponds

PREPARED BY: Larry K. Graham

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APPROVED BY:


Superintendent
Fisheries Research

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Work Plan No. 4, Job No. 7.

An Evaluation of Several Stocking
Combinations For Ponds.

Larry K. Graham, Project Leader

Abstract

Three species combinations, largemouth bass - golden shiner, largemouth bass - redear sunfish - red shiner, and largemouth bass - bluegill, were studied to determine their relative merits for stocking ponds. Bass grew best in the largemouth bass - bluegill combination, and the poorest bass growth was found in the largemouth bass - redear sunfish - red shiner ponds. Although two of the three largemouth bass - redear sunfish - red shiner ponds were contaminated with bluegill, a noticeable shortage of young-of-the-year forage was apparent.

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Introduction

The objective of this study is to determine merits of several combinations of fish species for stocking farm ponds. Three combinations are being tested in nine half-acre ponds at the Little Dixie Wildlife Area. Largemouth bass (100 per acre) were stocked in combination with each of the following forage species: (1) bluegill (500 per acre), (2) golden shiner (1000 per acre), and (3) redear sunfish (300 per acre) and red shiner (1000 per acre). Three replicates of each combination were stocked in the fall of 1967, with the exception of the largemouth bass-bluegill combination, which was added to the study in early spring, 1968. All fish stocked were less than 3 inches in total length. These populations will be allowed to develop under natural conditions as nearly as possible and will be sampled each succeeding fall by either seining or draining. Limnological data (temperature, conductivity, and turbidity) will be obtained weekly during the fish growing season.

Fish Populations

Fish populations were sampled in the fall of 1969, after a partial drawdown, by seining with a 150 foot, half-inch mesh drag seine, and a 25 foot, one-quarter-inch mesh bag seine. The best overall bass growth occurred in the largemouth bass-bluegill combination (Table 1). Average lengths and weights of bass in this combination were 0.9 inches and 3.0 ounces greater than those in the other combinations. The largest

Table 1. Average total length and weight of largemouth bass (predator species) and various forage species in the Little Dixie Wildlife Area Ponds, 1969, (Numbers of fish in parenthesis).

Combination	<u>Predator Species</u> Average		<u>Forage Species</u> Average	
	Total Length	Weight	Total Length	Weight
Bass - golden shiner				
Adult	12.3 (59)	16.7	7.2 (366)	2.7
Inter.	7.4 ()	3.1	4.9 (430)	0.5
Y-O-Y	2.4 (46)	<0.5	2.8 (8)	<0.5
Bass - bluegill				
Adult	12.8 (26)	19.7	5.7 (77)	2.2
Inter.	6.8 (14)	2.5	3.9 (106)	0.5
Y-O-Y	2.5 (25)	<0.5	2.1 (30)	<0.5
Bass - redear				
Adult	11.6 (69)	13.4	7.5 (271)	4.4
Inter.	7.3 (25)	3.5	4.8 (86)	1.2
Y-O-Y	2.9 (15)	<0.5	2.6 (13)	<0.5
- red shiner				
Adult			(0)	
Inter.			3.5 (3)	<0.5
Y-O-Y			2.8 (38)	<0.5

individual bass in the largemouth bass - bluegill combination attained a length of 15.0 inches and a weight of 34.0 ounces. The poorest bass growth among the three combinations tested was in the largemouth bass - redear sunfish - red shiner ponds.

Fish growth data from the same ponds one year earlier (Graham, 1969) show a complete reversal in growth rates. At this time the best overall bass growth was found in the largemouth bass - redear sunfish - red shiner combination, while the poorest growth was found in the largemouth bass - bluegill ponds.

The poor growth rate of bass in the largemouth bass - redear sunfish - red shiner combination may be attributed to turbid water which interfered with their feeding, and to an apparent absence of young-of-the-year forage fish. Turbidities (Table 2) show that two of the three largemouth bass - redear sunfish - red shiner ponds were extremely turbid during early summer. On May 16, 1969, ponds number 13 and 17 were treated with gypsum at the rate of 12 pounds per 1000 cubic feet of water. Within two days colloidal clays began to precipitate and turbidities decreased. Turbid water prior to the gypsum application may have impeded fish reproduction and growth.

Forage fish fry were observed throughout the summer in all ponds except the largemouth bass - redear sunfish - red shiner combinations. Possibly the influence of turbid waters in two of the three ponds explains why no redear or red shiner fry were observed. During fall seining, 41 young-of-the-year red shiners were collected but 37 of them came from Pond 13. This pond also produced the only three intermediate-sized red shiners collected during fall sampling. Intermediate-sized redear (average total length 4.8 inches) were found in only two

Table 2. Average monthly secchi-disk readings, March through October, 1969, in ponds at Little Dixie Wildlife Area.

Pond No.	March	April	May	June	July	August	September	October
Largemouth bass - golden shiner								
2	67	56	68	32	30	52	63	47
4	65	58	72+	46	52	65	58	72
6	30	36	51	26	19	30	27	28
Largemouth bass-bluegill								
8	43	59	72	43	49	52	71	63
9	28	54	55	29	33	43	57	46
16	35	26	44	24	24	28	21	17
Largemouth bass-redder sunfish-red shiner								
13	12	11	9	19	21	39	40	49
17	21	10	13	32	25	34	28	26
20	26	43	44	24	19	40	29	33

of the three ponds. Two of the three ponds were heavily contaminated with bluegill. The ratio of young-of-the-year redear to bluegill in Ponds 13 and 17 approached 1:100. There was an apparent shortage of young-of-the-year redear in all three ponds. Regardless of the fact that two of the three ponds were contaminated, a noticeable shortage of forage was apparent and may account for the poor bass growth. In the largemouth bass - bluegill ponds, young-of-the-year bluegill were observed periodically through the summer months. In these same ponds, intermediate-sized bluegill (average total length 3.9 inches) were found in good numbers.

In the largemouth bass - bluegill ponds, young-of-the-year golden shiners were numerous throughout the summer months, however, only 8 fish were taken during fall seining. In these same ponds, intermediate-sized golden shiners (average total length 4.9 inches) and adult golden shiners (average total length 7.2 inches) were numerous.

If redear sunfish fail to reproduce in sufficient numbers when in company with bluegill, this is a serious draw-back to their use as a forage species. Redear sunfish, in most cases, grow faster than bluegills, but this advantage may be offset by their low reproductive potential, especially when forced to compete with bluegills in the same waters. Bluegill contamination in supposedly pure cultures of redear sunfish, and the apparent scarcity of young-of-the-year redear sunfish and red shiner, indicates that the largemouth bass - redear sunfish - red shiner combination should be terminated. The remaining fish combinations will be subjected to angling and more thoroughly evaluated during 1970.

Literature Cited

Graham, Larry K. 1969. An evaluation of several stocking combinations.

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